



2001 Joint Services Small Arms Symposium
August 16, 2001

Small Arms Technology and Integration

Presented by

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Vision Technologies Kinetics

(Singapore Technologies Kinetics)





Outline

- Company Profile
- SAR21
- Airburst Munition System
- Super Light Weight AGL

Singapore Technologies Kinetics (VT Kinetics)



- Land System
- 4 core businesses

Automotive

Ammunition

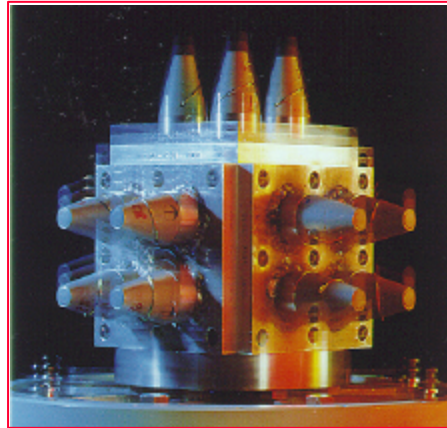


**Singapore Technologies
Engineering**

Singapore Technologies Kinetics



Services



Weapon



Small Arms



Arty



Air Defence



Small Arms - Product Range



Rifles: 5.56 mm



SR 88



SAR 21

Machine Guns:

5.56mm, 7.62mm,
0.5"



5.56mm Light
Machine Gun



GPMG



50 MG

Grenade Launchers:

40 mm LV, 40 mm HV, 76 mm
Smoke



SSGL



40 AGL



SGL



Small Arms - Product Range

Weapon Mountings and Stations

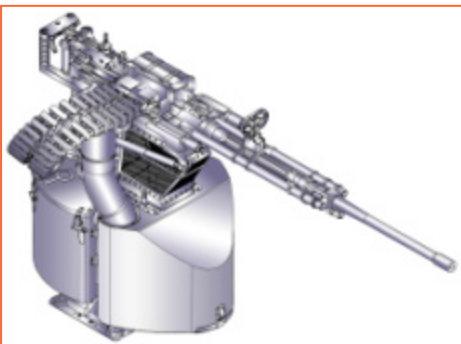
40/50 Cupola



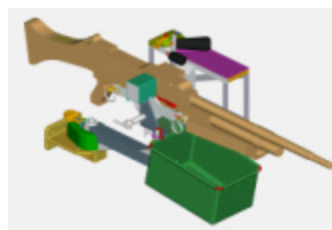
**40/7.62 Remote
Weapon Station**



40 Soft Mount



Helicopter Mount



GPMG mount



Telemast



SAR 21





DESIGN FEATURES

- Bullpup Design
 - shorter in length and compact
- Low Recoil
 - better controllability and maneuverability
- Ergonomic Design
 - perfect balance
- Integrated Sighting
- Safety



DESIGN FEATURES



- Modular Construction
 - 5 basic groups
 - easy to maintain





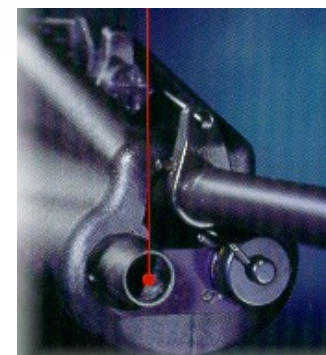
Integrated Sightings - 1.5x scope and Laser Aiming Device

- Rugged construction
- Minimal Zeroing
- No set up time



Integrated 1.5x scope

- For Bigger Field of view - 8.5°
- Able to aim with both eyes opened
- Quick aiming
- 3x scope optional



Integrated Laser Aiming Device

- For short range low light engagement
- Visible or IR
- Factory zeroed





Variants



SAR21 Modular Mounting System

SAR21 Family of Weapon



Sar 21 Picatinny Rail



Sar 21 M203



Sar 21 M16 Mag



Carbine



Sar 21 Modular Mounting System





Developmental

40mm Super Light Weight Automatic Grenade Launcher (AGL) Weapon System

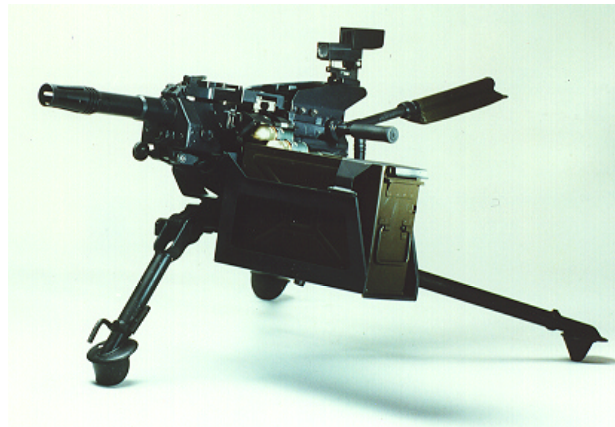




What is Current ?



Impact Fuze
Point Detonated



[CIS 40ACL]

Fires conventional 40 HV ammo
System weight greater than 90 Kg

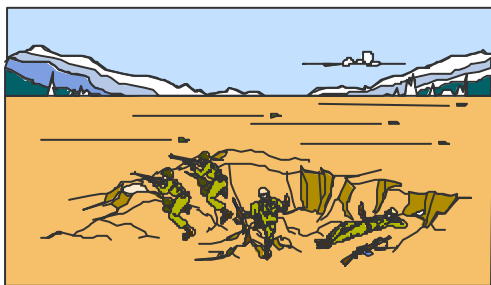


MK19

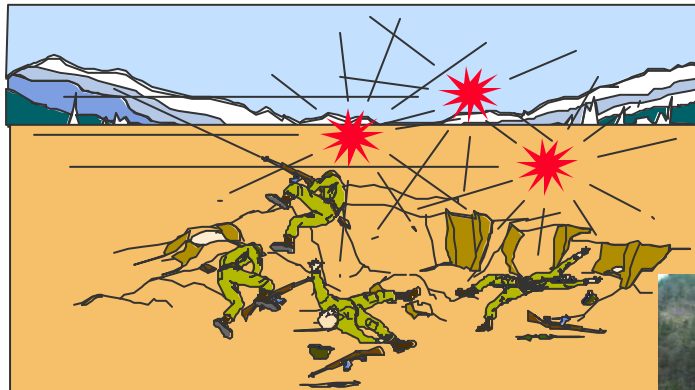


What is the **TREND** ?

Ammo - Programmable Airburst Munition



KE ammo can only suppress personnel in defilade



Programmable ammo kills
No way to hide



Weapon System

- *As light as possible*
- *For fast deployment operation*
- *Equip with FCS*





Programme Objectives

To develop:

- **Programmable Airburst Munition**
- **Airburst Munition Weapon Upgrading Kit**
- **Light Weight AGL Weapon System**



Air-Bursting Munitions (ABM)

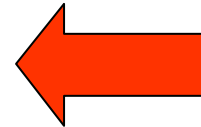
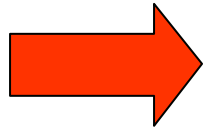
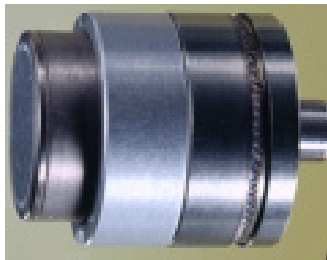
Advanced Development



40mm ABM Technology



Jointly Developed



AHEAD Fuzing Technology
from
Oerlikon Contraves

40mm Cart. Technology
from
ST Kinetics



Air-Bursting Munitions (ABM)



Complete Round

Length : 112mm max

Mass : 350 gm

Projectile Mass : 245 gm

Muzzle Velocity : 242 m/s

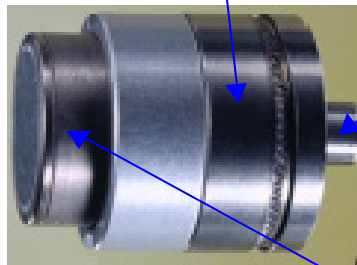
Arming Distance : 18 m to 40 m

Maximum Range : 2200 m

ABM Projectile



Electronic Timer Module



Power Supply
(Setback
Generator)

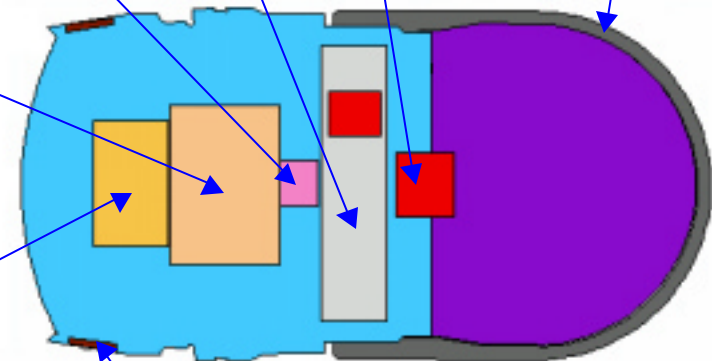
Safe & Arm

Squib

Booster

Blast
Fragmentation
Warhead

Receiving Coil for Fuze Programming

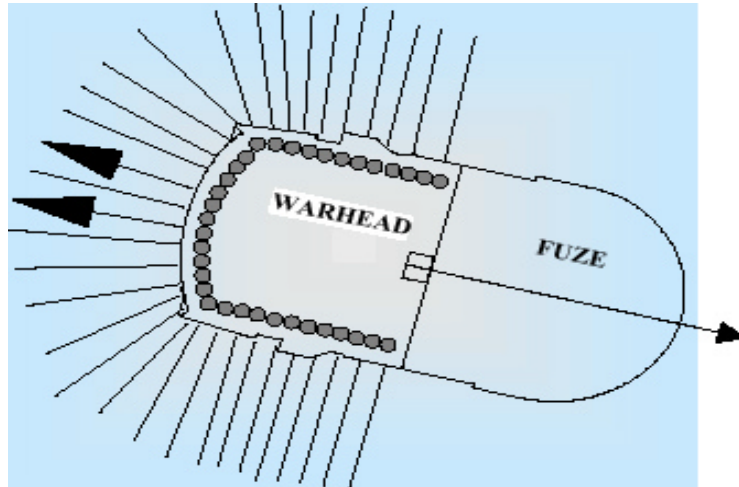


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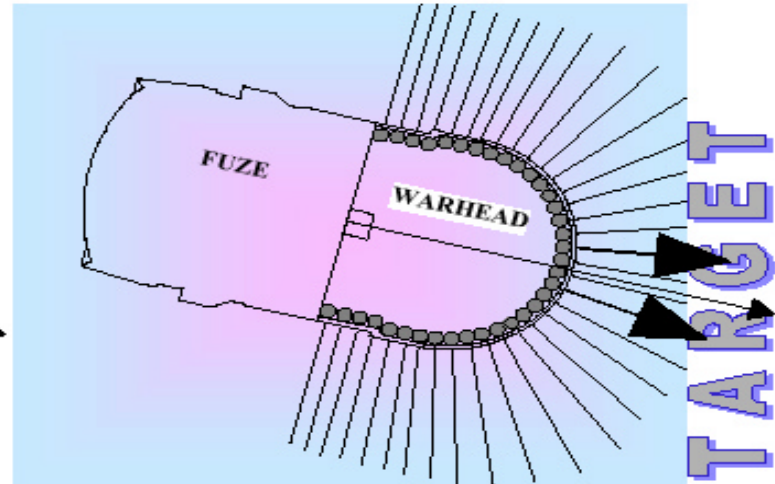
Warhead Concept



Others



ST Kinetics



Air-Bursting Munition



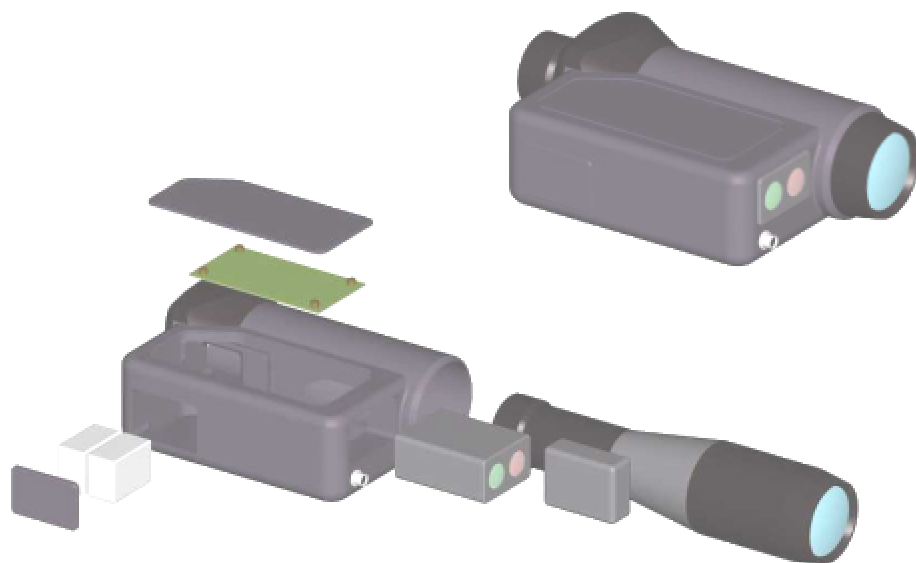
VT Kinetics



Singapore Technologies
Engineering



Air-Bursting Munition Weapon Upgrading Kit



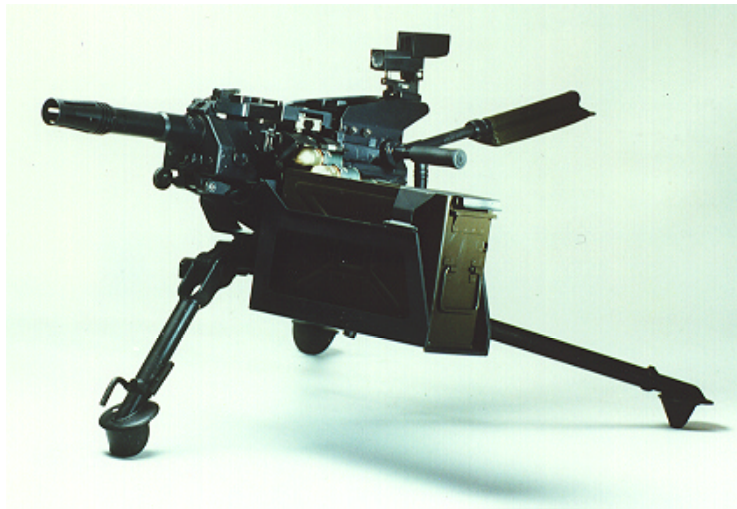
- ST Kinetics
- Oerlikon Contraves
- Thales
- Team One

Upgrading Kit

**Fire Control
System**



**Ammunition
Programmer**



- **No Modification of Weapon**
- **Just add on the Muniton Programmer and FCS**

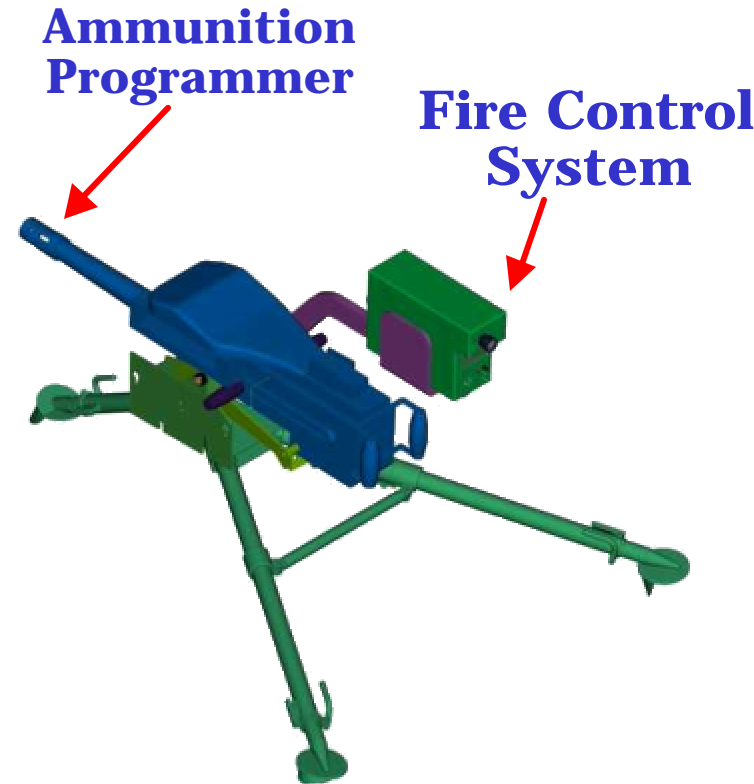
Upgrading Kit



Suitable for others AGL system



MK19



- **No Modification of Weapon**
- **Just add on the Munition Programme and FCS**





Ammunition Programmer

Attach to
Barrel

Connect to Fire
Control

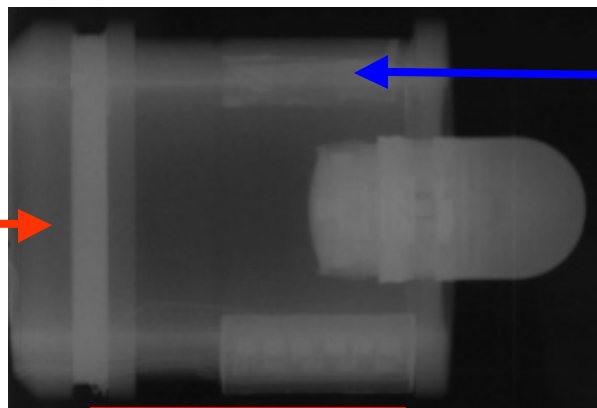


Receiving Coil



Projectile

Trigger Coil



X-Ray Picture

Programming Coil



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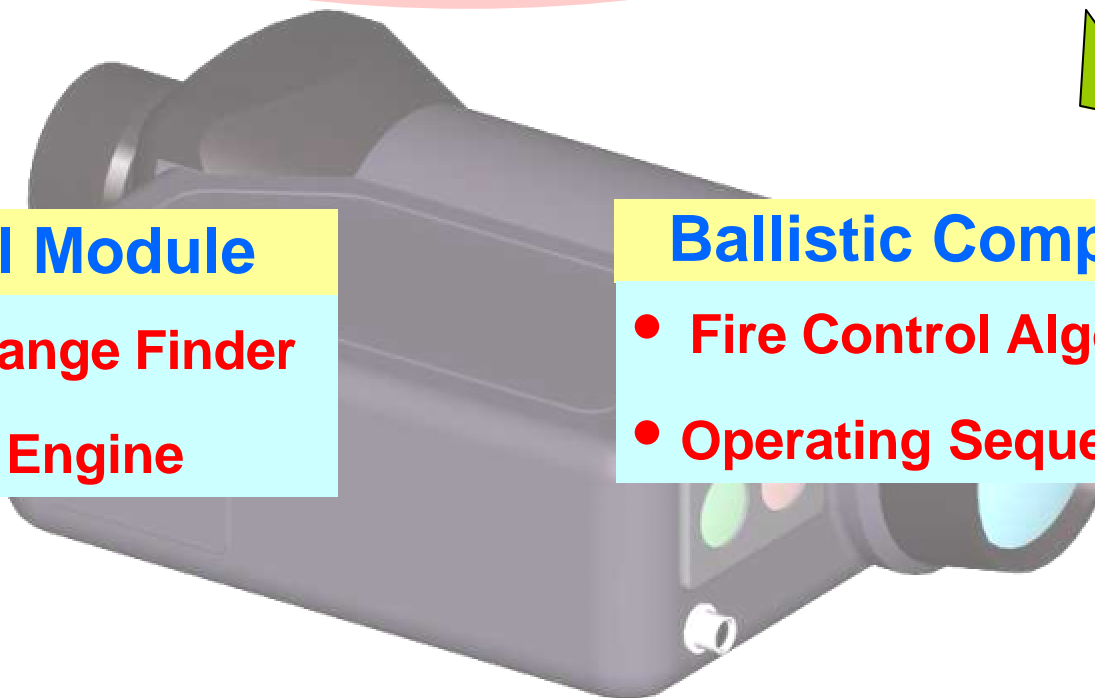
Fire Control System

Optical Module

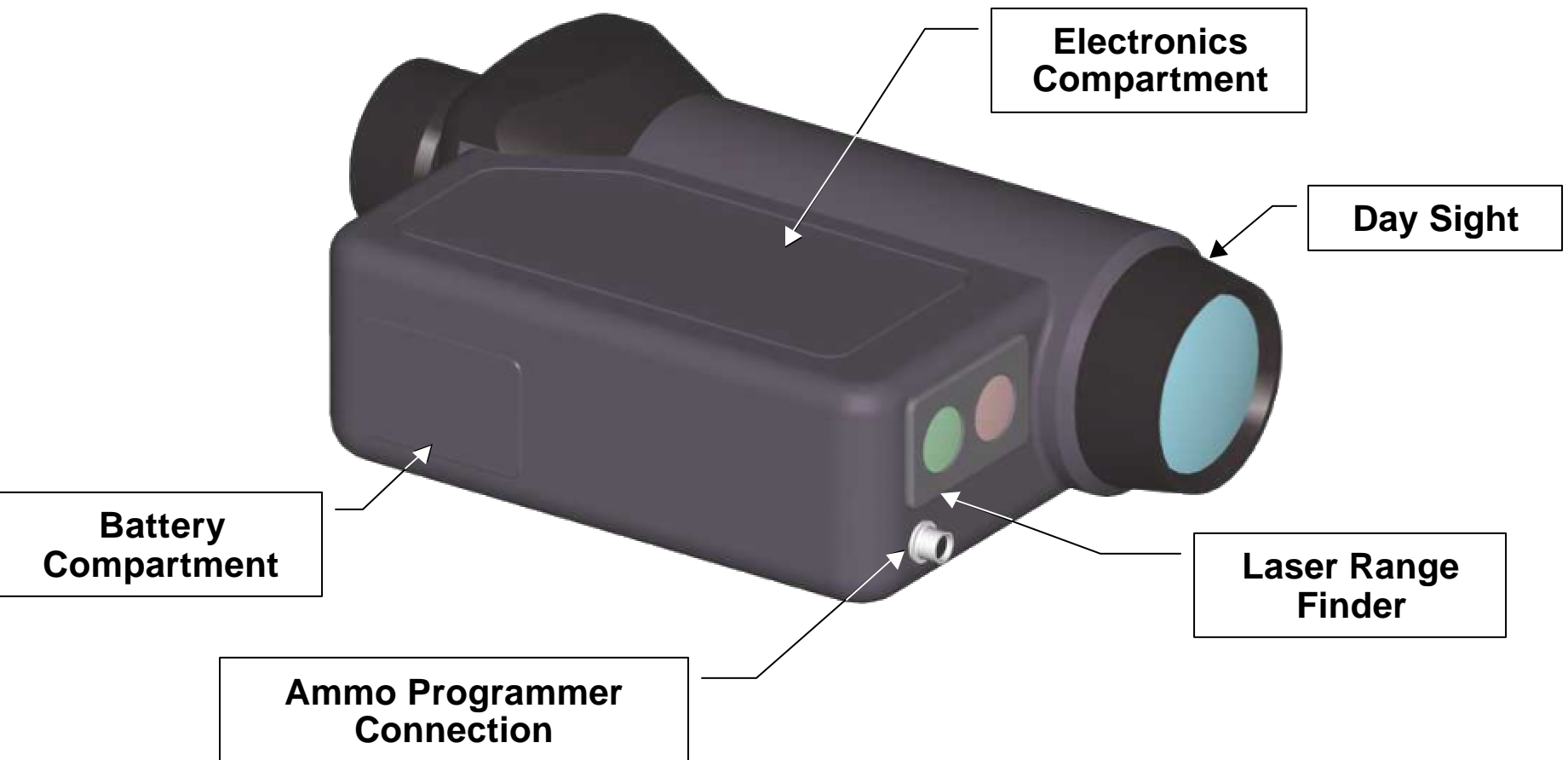
- Laser Range Finder
- Display Engine

Ballistic Computer

- Fire Control Algorithm
- Operating Sequence



Fire Control System





System Parameters

Dimensions :	290(L) x 180(W) x 100(H)
Weight :	Less than 5kg with batteries
Day Sight :	3x Magnification (Min)
Battery Power :	12 V DC Nominal
Battery Life :	More than 6 Hours (Continuous Operation)
Operating :	-40°C to +55 °C
Laser Range :	2 Km \pm 1m



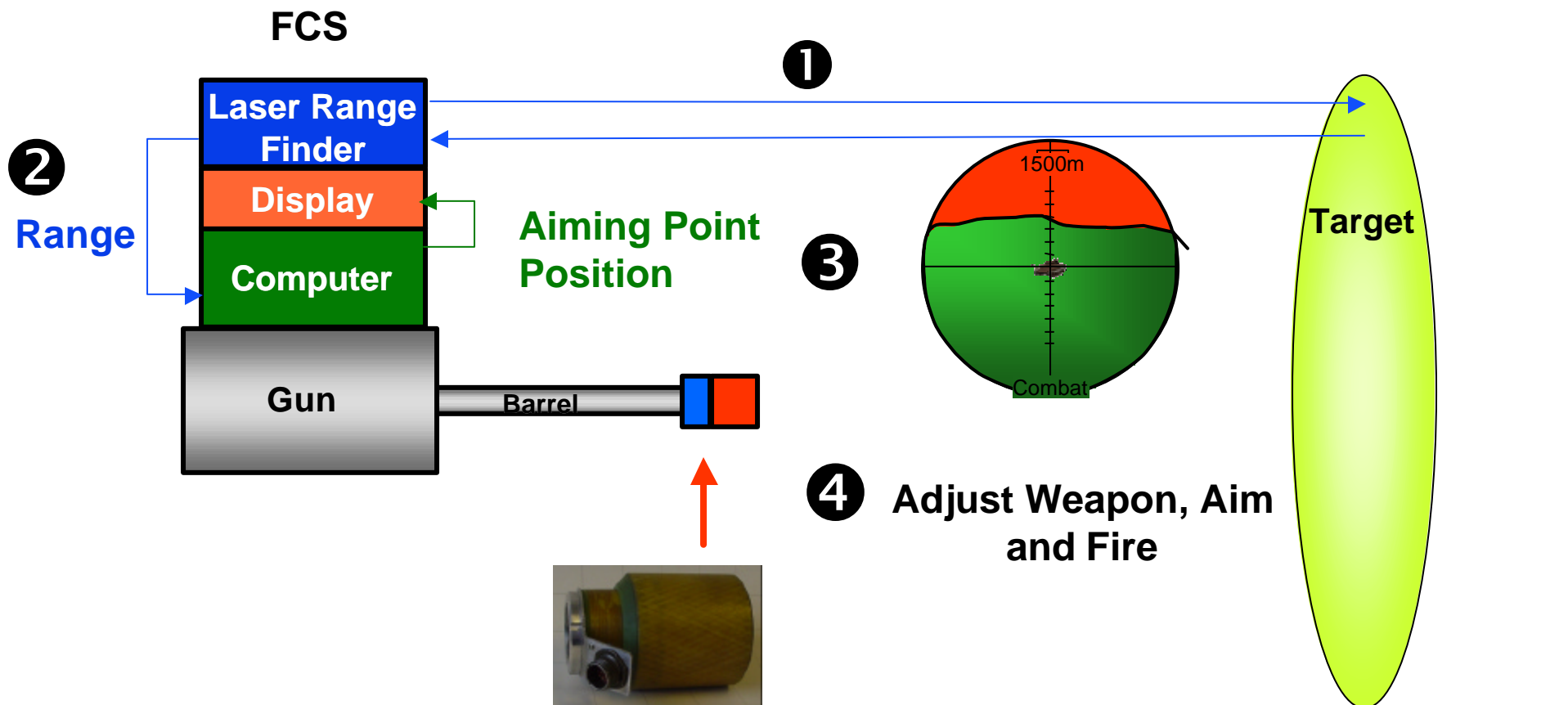
Special Features

- ◆ Fast and accurate gunner operation with
 - **Ballistic Computer providing information and ballistic solution recticle through view optics**
- ◆ Day and Night Operation
 - **Provision for mounting Night Sight**
- ◆ Programmable features such as “String of Pearls” setting
 - **Powerful Ballistic Computer providing information and ballistic solution recticle through view optics**
- ◆ Future upgrade to include
 - **Training Simulation**
 - **Remote Operation**
 - **Remote Display**



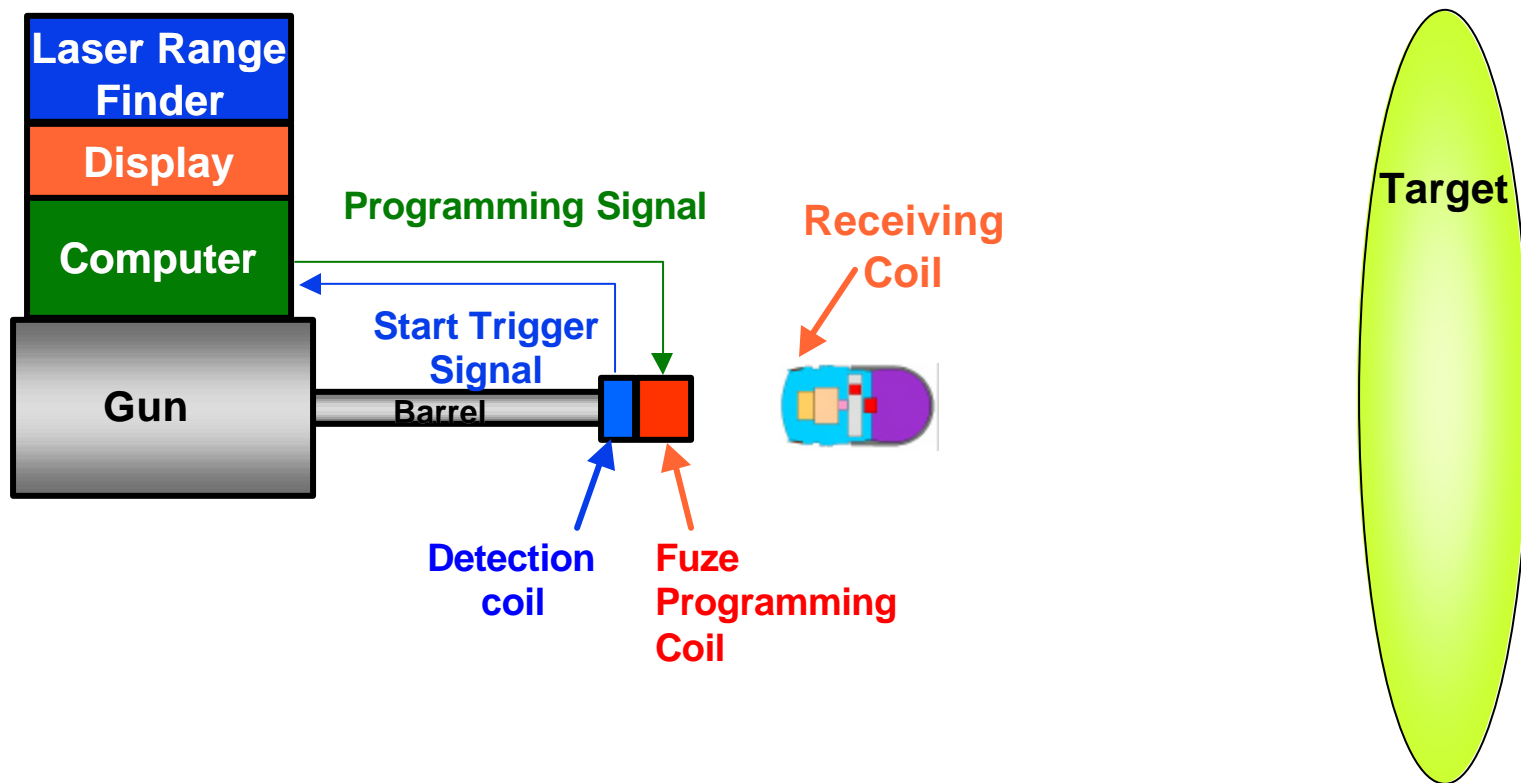


Sequence of Operation



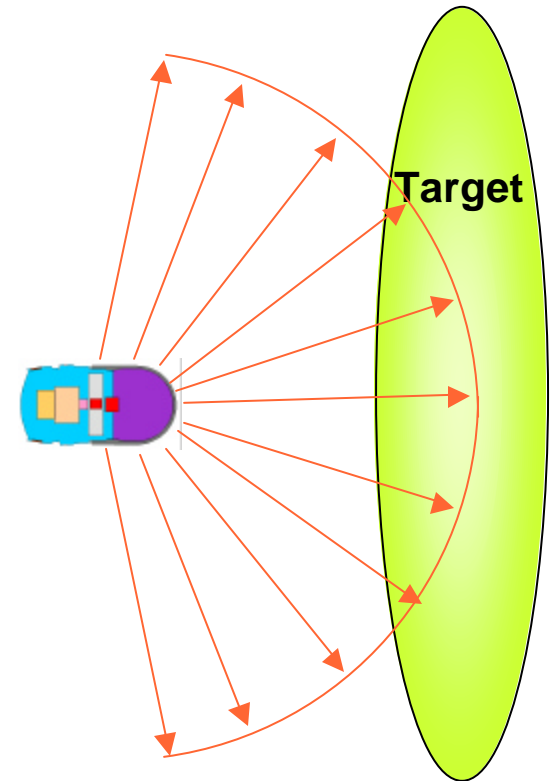
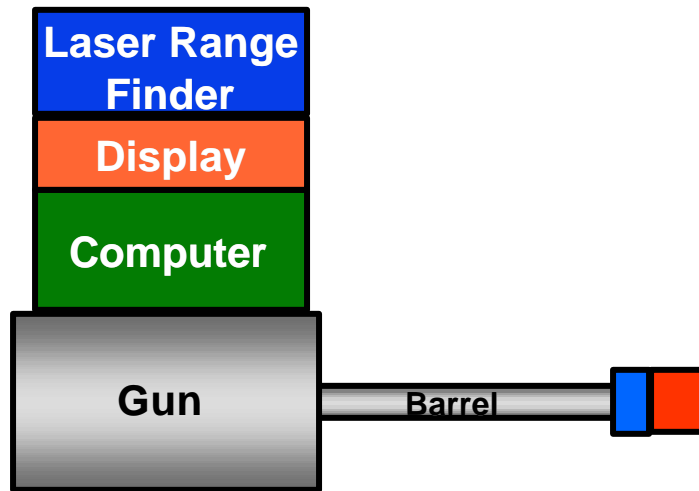


Sequence of Operation

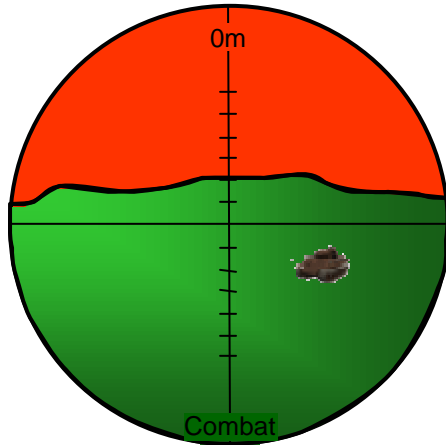




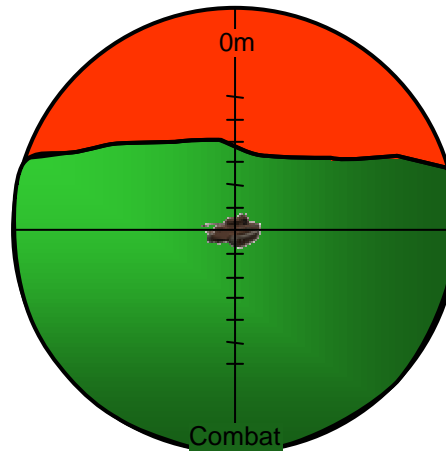
Sequence of Operation



Target Acquisition Procedure

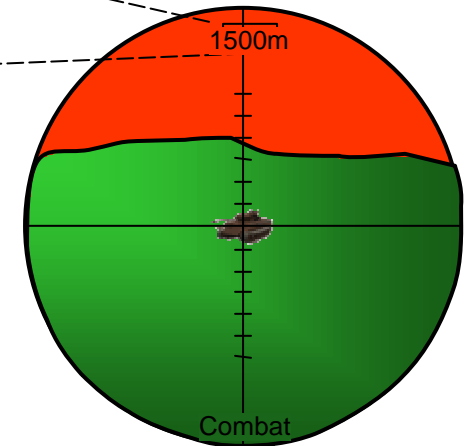


Operator sights Target in FCS



Operator moves Fixed
Aiming Recticle (FCS) to
Target

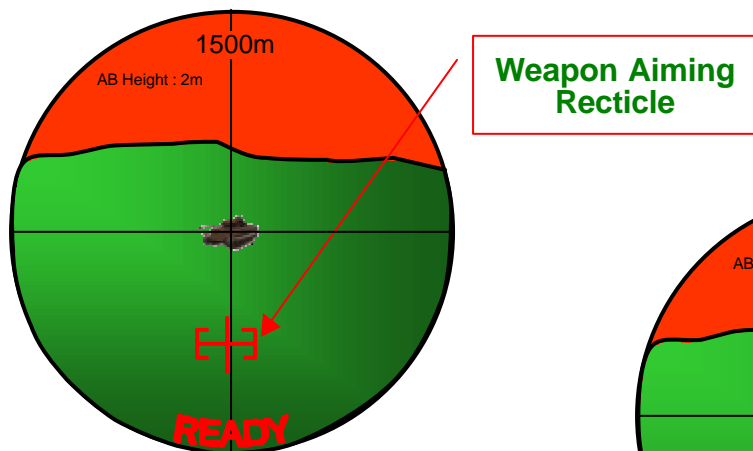
Range
1500m



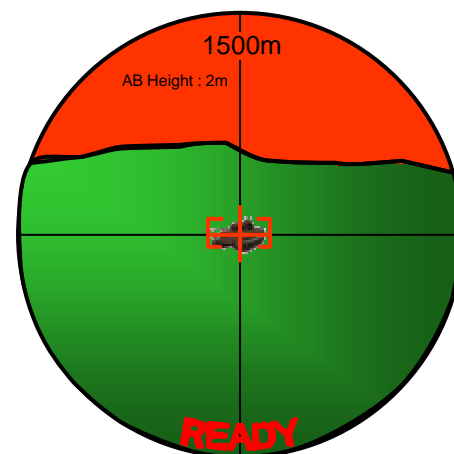
Operator Depresses **LASE**
Button. Range reflected in
sight



FCS computes and displays Weapon Aiming Recticle

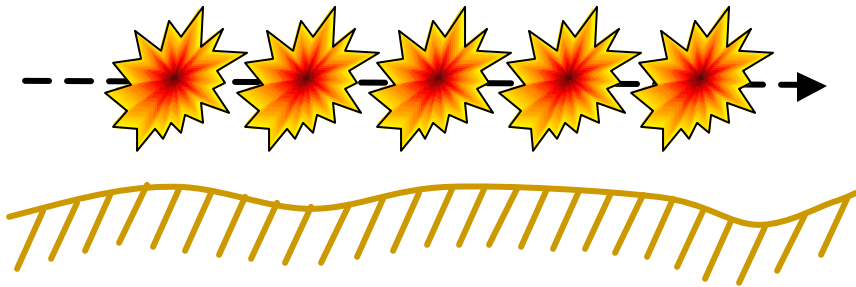


User ready to fire weapon



Operator moves weapon to
target. Floating recticle
moves to update weapon
position

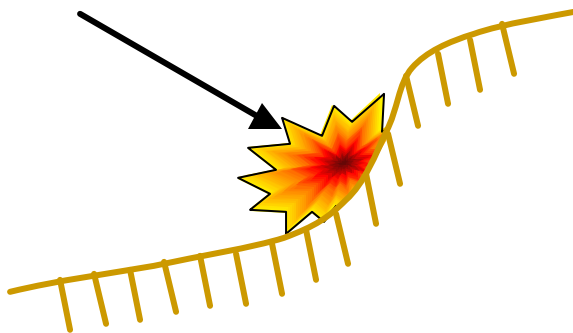
Programmable Feature



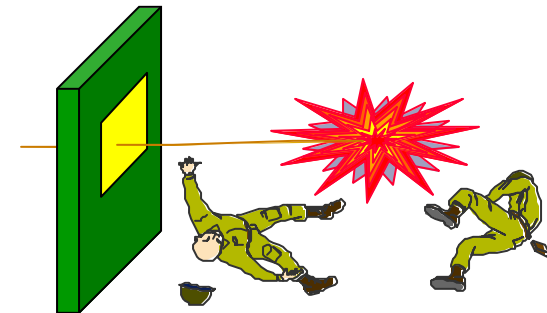
String of Pearls



Point Detonating (PD)



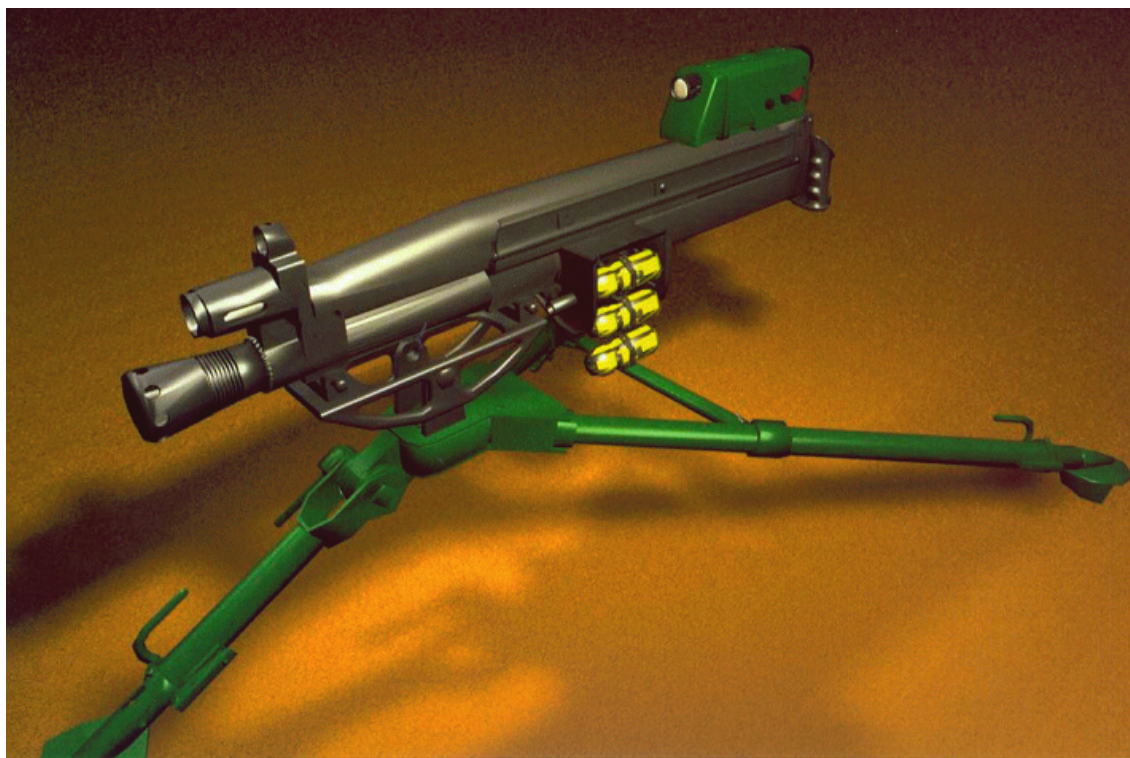
Air Burst



Point Detonating Delay

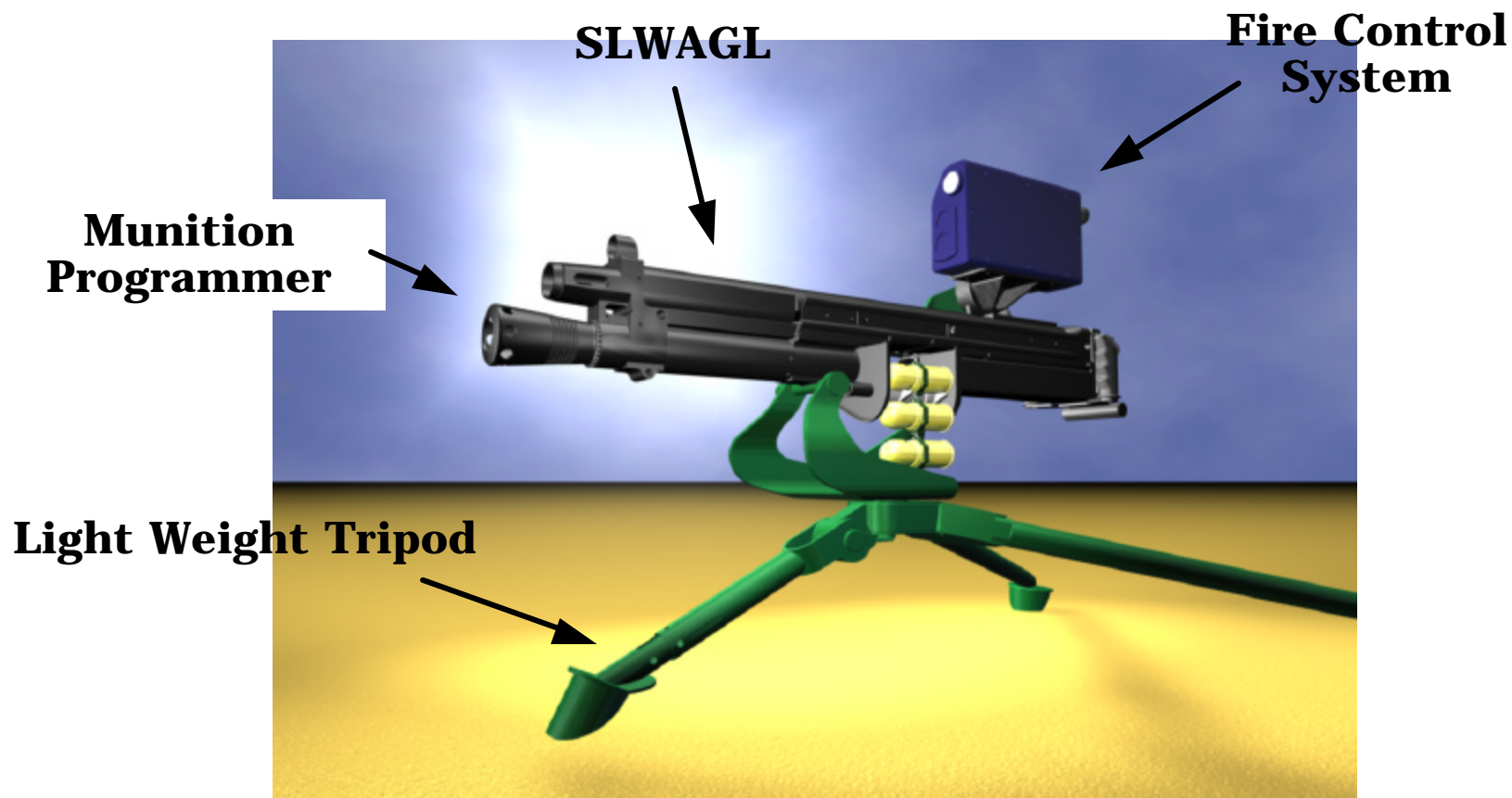


40mm Super Light Weight Automatic Grenade Launcher





System Configuration





Technical Features

- **Lightweight - 16 kg compared to 33 kg**
- **Compact design**
- **Low peak recoil impulse - more than 50% reduction**
- **Direct Blow Back**
- **Opened Bolt Firing**
- **FCS with Programming Ammunition Capability**



Technical Specifications (Provisional)



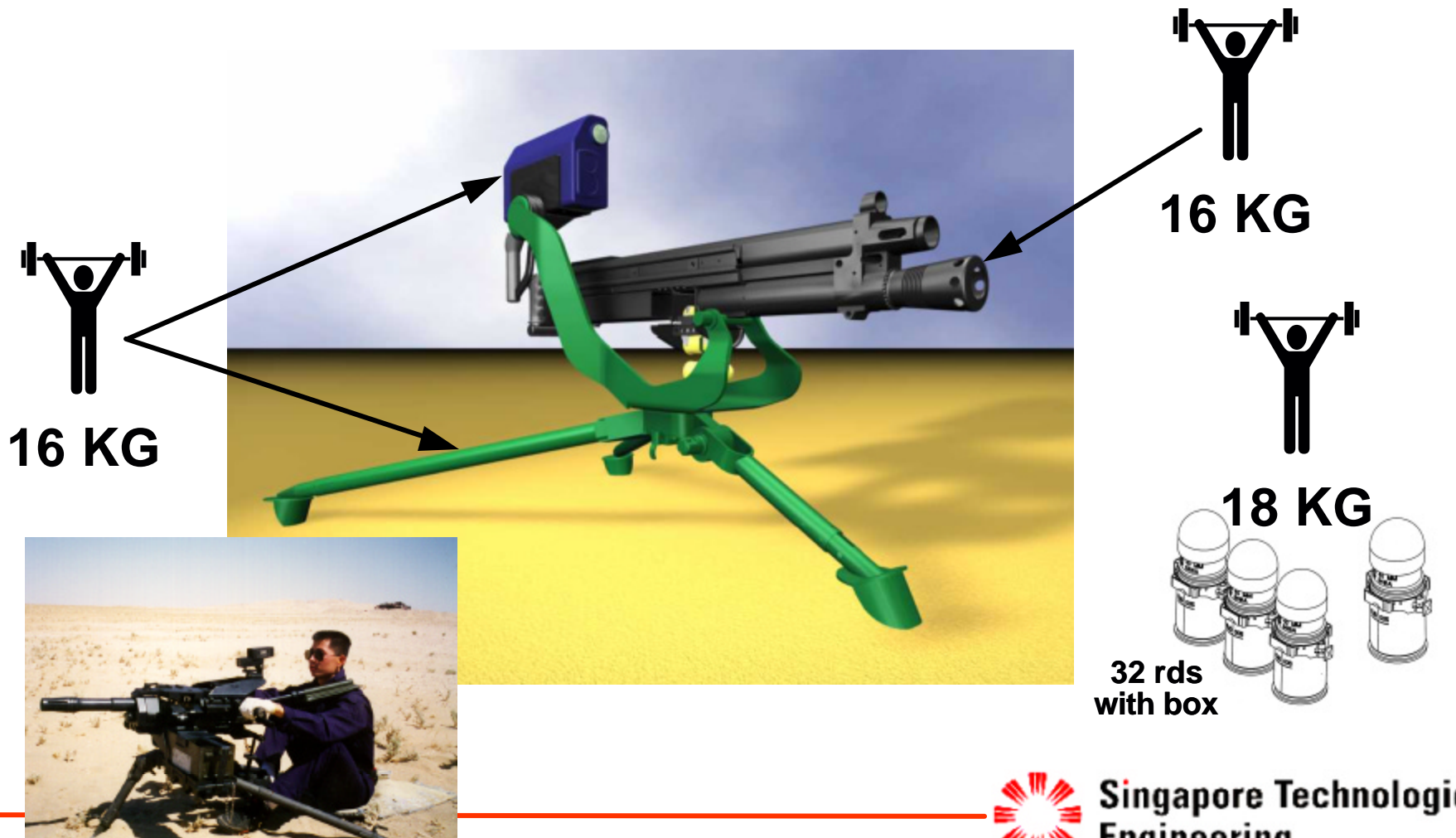
Overall Length	1000 mm
Width	230 mm
Weight	16 Kg
Muzzle Velocity	241 m/s
Rate of Fire	350 RPM
Firing Mode	Automatic
Maximum Range	2200 m
Maximum Effective	1500 m
Barrel length	18
No. of Grooves	1 Twist in 48 inch
Rifling Twist	



Man-pack Configuration

3 soldiers with each not carrying more than 20 Kg.

Total System Weight - 50 Kg





Weight Breakdown

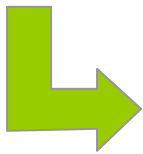
Steel - 60%

Titanium - 30%

Aluminum - 10%



Low Recoil



Lower Strength requirement

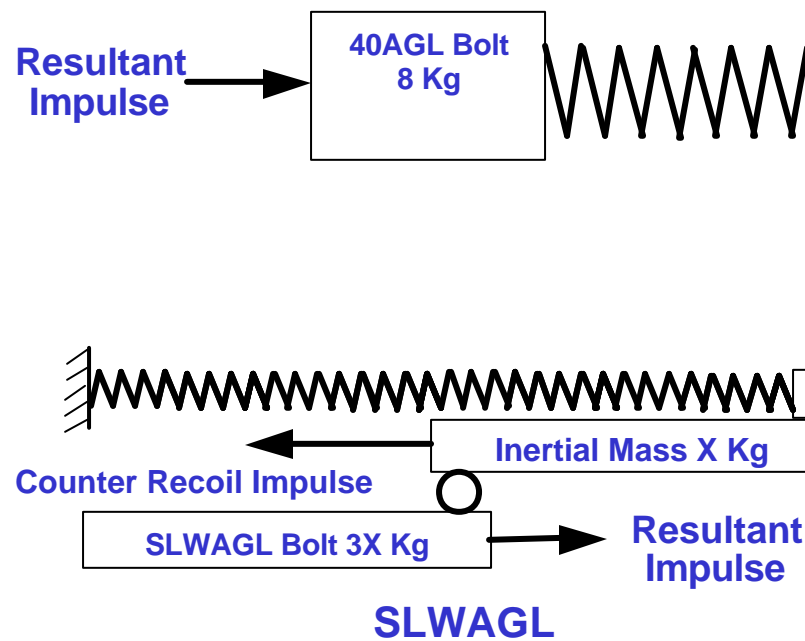
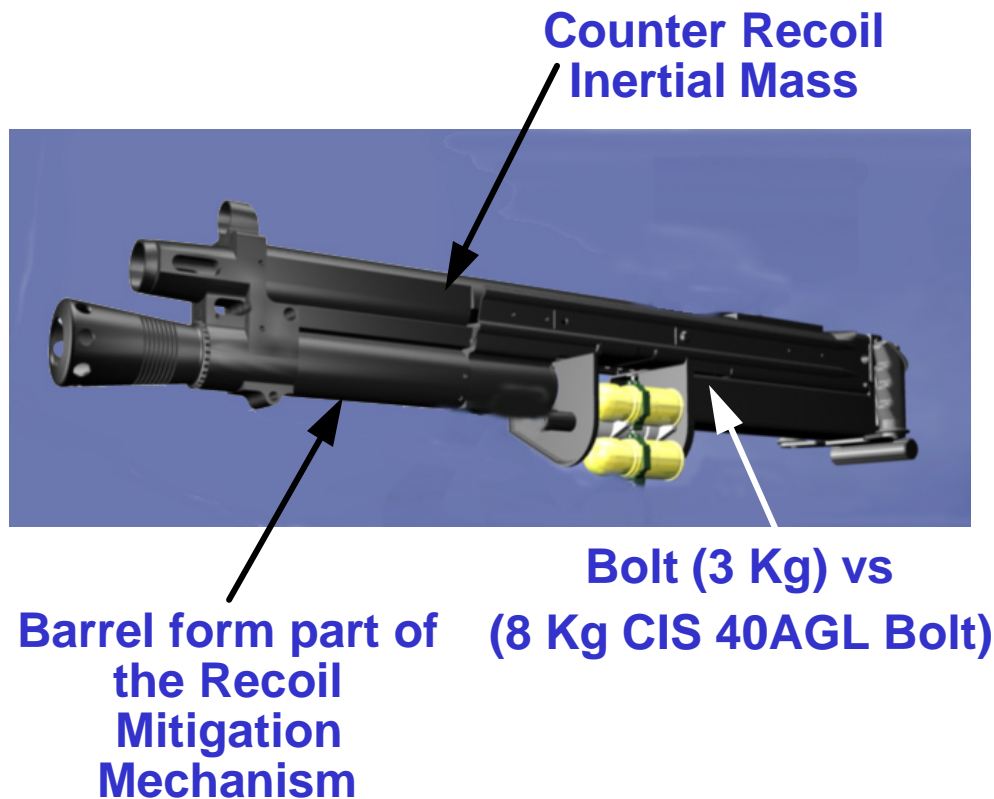


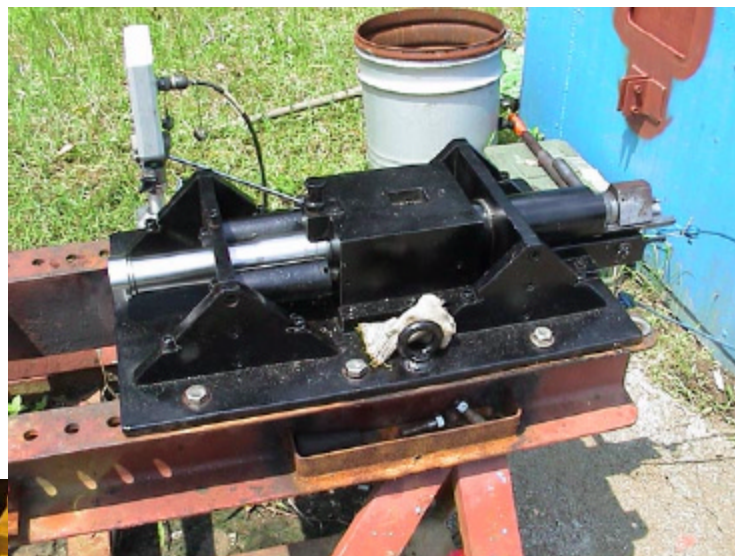
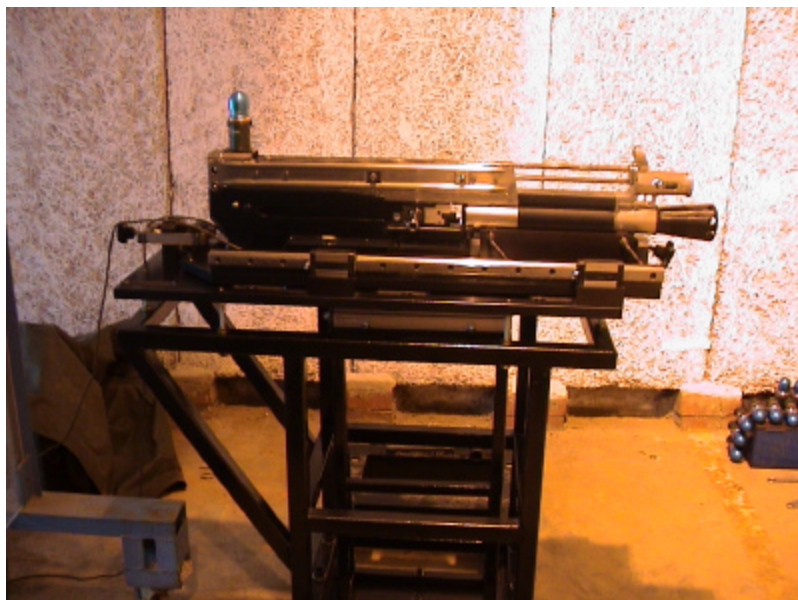
Lighter Structure

- Gun Components
- Mounting



Recoil Mitigation System - Counter Recoil Inertia Mass







Light Weight Tripod

- ◆ Weight - 11kg
- ◆ Length (extended) - 145cm
- ◆ Length (folded) - 100cm
- ◆ Height - 35cm
- ◆ Traverse Range - 360 degree
- ◆ T & E Mount - 3 kg

